

Signet 8550 Flow Transmitters



Check out the 9900 Transmitter
for your single channel needs

Member of the ProcessPro® Family of Instruments



Panel Mount



Pipe, Wall, Tank and
Integral Mount

Signet 8550 Flow Transmitters are advanced instruments that convert the signal from frequency and digital (S³L) flow sensors into a 4 to 20 mA signal for long distance transmission. Configuration flexibility is maximized with single or dual input/output, two optional relays for process control, two packaging options for integral/pipe mount or panel installation, and scalability for virtually any flow range or engineering unit. State-of-the-art electronic design ensures long-term reliability, signal stability, and simple user setup and operation.

Features

- 2 or 4 wire power
- Available with single or dual input/output
- 4 to 20 mA scaleable outputs
- Permanent & resettable totalizers
- Relay options available
- NEMA 4X enclosure with self-healing window
- Output simulation for complete system testing



Applications

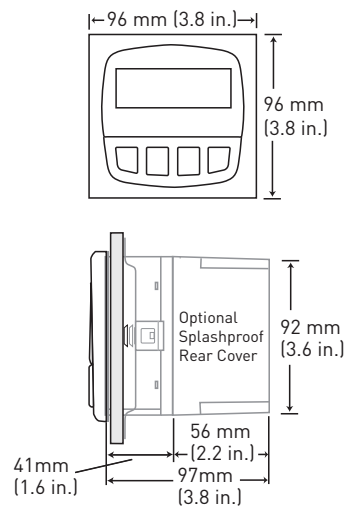
- Flow Control and Monitoring
- Filtration or Softener Regeneration
- Effluent Totalization
- Pump Protection
- Feed Pump Pulsing
- Ratio Control
- Water Distribution
- Leak Detection

Specifications

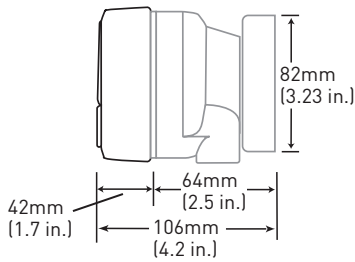
General		
Compatibility		Signet Flow Sensors with frequency outputs
Accuracy		± 0.5% of reading
Display		Alphanumeric 2 x 16 LCD
Update Rate		1 second
Contrast		User selectable, 5 levels
Materials		
Enclosure		PBT resin
Keypad		Sealed 4-key silicon rubber
Panel and Case Gasket		Neoprene
Window		Polyurethane coated polycarbonate
Electrical		
Power		12 to 24 VDC ±10%, regulated
	-1	90 mA max.
	-2	220 mA max.
	-3	100 mA max.
Sensor Input Range		0.5 to 1500 Hz
Sensor Power		2-wire: 5 VDC ± 1% @ 1.5 mA
		3 or 4 wire: 5 VDC ± 1% @ 20 mA
		Optically isolated from current loop short circuit protected
Current Output		4 to 20 mA, isolated, passive, fully adjustable and reversible
Max. Loop Impedance		50 Ω max. @ 12 V
		325 Ω max. @ 18 V
		600 Ω max. @ 24 V
Update Rate		100 ms
Accuracy		±0.03 mA
Relay Output		
Mechanical SPDT contacts		High, Low, Pulse, Off
Maximum Voltage Rating		30 VDC @ 5 A , 250 VAC @ 5 A resistive load
Hysteresis		User selectable
Maximum 400 pulses/min		
Open-Collector Output		
		High, Low, Pulse, Off
		Optically isolated, 50 mA max. sink, 30 VDC max. pull-up voltage.
Hysteresis		User selectable for exiting alarm condition
Maximum 400 pulses/min.		
Environmental		
Operating Temperature		-10 °C to 70 °C 14 °F to 158 °F
Storage Temperature		-15 °C to 80 °C 5 °F to 176 °F
Relative Humidity		0 to 95%, non-condensing
Enclosure		NEMA 4X/IP65 (front face only on panel mount); field mount is 100% NEMA 4X/IP65
Shipping Weight		
		0.325 kg 0.7 lb
Standards and Approvals		
		CE, UL, CUL
		RoHS compliant
		China RoHS
		Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management




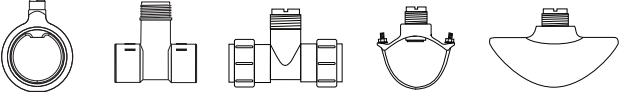
Dimensions

3-8550-XP



Field version with universal mount



System Overview	Panel Mount	Field Mount - Pipe, Tank, Wall	Integral Mount
	Signet 8550 Flow Transmitter (Includes mounting bracket and panel gasket)	Signet 8550 Flow Transmitter with 3-8050 Universal Mount Kit	Signet 8550 Flow Transmitter with 3-8051 Universal Mount Kit
			
	Signet Sensor 515 525 2000 2100 2507 2536 2537 2540 2551 2552	Signet Sensor 515 2507 2540 525 2536 2537 2000 2551 2552 2100	Signet Integral Mount Sensor 3-8510-XX 3-8512-XX
Signet Fittings			
			
All sold separately			

Ordering Notes

- 1) Use the field mount version to directly mount the instrument to the Model 515 or 2536 integral mount sensor. See sensor data sheet for more information.
- 2) Field mount and sensor can be ordered in a package. See Integral Mount for more information.
- 3) Panel cutout should be 92 mm X 92 mm (3.62 in X 3.62 in.).
- 4) An optional splashproof rear cover for the panel mount version can be ordered separately if needed.

Please refer to Wiring, Installation, and Accessories sections for more information.

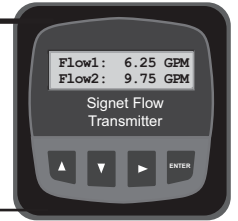


WARNING!

- Remove power to unit before wiring input and output connections.
- Follow instructions carefully to avoid personal injury.

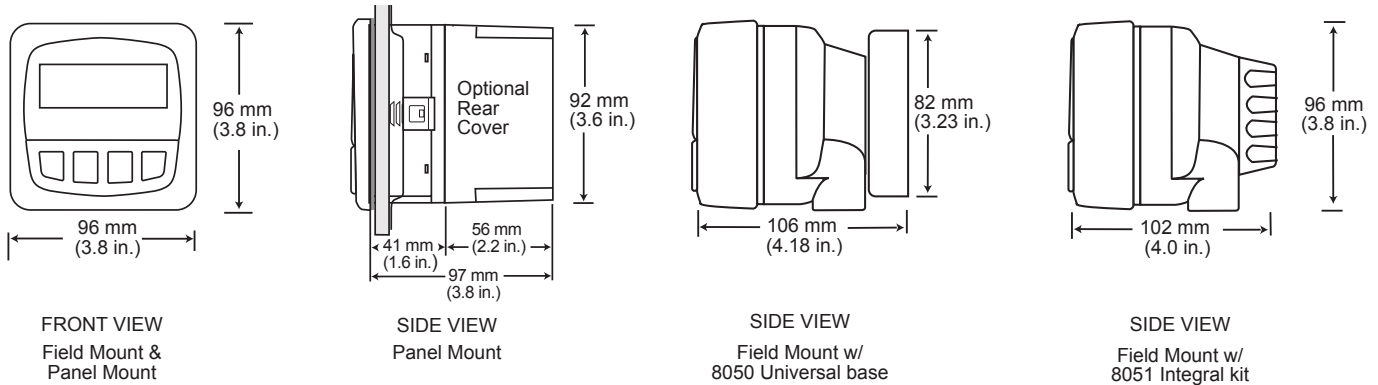
Contents

- | | |
|---------------------------|-------------------------|
| 1. Specifications | 4. Menu Functions |
| 2. Installation | 5. Troubleshooting |
| 3. Electrical Connections | 6. Ordering Information |



1. Specifications

Dimensions



General

Compatibility: Signet Flow Sensors (w/freq out)

Enclosure:

- | | |
|----------------------|-----------------------------------|
| • Case: | PBT |
| • Panel case gasket: | Neoprene |
| • Window: | Polyurethane coated polycarbonate |
| • Keypad: | Sealed 4-key silicone rubber |
| • Weight: | Approx. 325 g (12 oz.) |

Display:

- | | |
|------------------------------|----------------------------|
| • Alphanumeric | 2 x 16 LCD |
| • Update rate: | 1 second |
| • Contrast: | User selected, 5 levels |
| • Accuracy: | ± 0.5% of reading @ 25 °C |
| • Thermal sensitivity shift: | ± 0.005% of reading per °C |

Electrical

- | | |
|----------|---|
| • Power: | 12 to 24 VDC ±10%, regulated, 100 mA max. |
|----------|---|

Sensor Inputs:

- | | |
|-----------------|----------------------------------|
| • Range: | 0.5 to 1500 Hz |
| • Sensor power: | 2-wire: 0.5 mA @ 5 VDC ± 1% |
| | 3- or 4-wire: 20 mA @ 5 VDC ± 1% |

- Optically isolated from current loop, short circuit protected

Current output:

- 4 to 20 mA, isolated, fully adjustable and reversible
- Max loop impedance: 50 Ω max. @ 12 V
325 Ω max. @ 18 V
600 Ω max. @ 24 V
- Update rate: 100 ms
- Accuracy: ± 0.03 mA

Open-collector outputs, optically isolated:

- 50 mA max. sink, 30 VDC maximum pull-up voltage.
- Programmable for:
 - High or Low setpoint with adjustable hysteresis
 - Pulse proportional to rate or volume (max 300 pulses/min).

Environmental

- | | |
|--------------------------|-----------------------------|
| • Operating temperature: | -10 to 70 °C (14 to 158 °F) |
| • Storage temperature: | -15 to 80 °C (5 to 176 °F) |
| • Relative humidity: | 0 to 95%, non-condensing |
| • Maximum altitude: | 2000 m (6562 ft) |
| • Insulation category: | II |
| • Pollution degree: | 2 |
| • Rating: | NEMA 4X/IP65 front |

Standards and Approvals:

- CE, UL listed
- Manufactured under ISO 9001 for Quality, ISO 14001 for Environmental Management and OHSAS 18001 for occupational health and safety.



China RoHS (Go to www.gfsignet.com for details)



Declaration of Conformity according to FCC Part 15

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
 (1) This device may not cause harmful interference, and,
 (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Installation

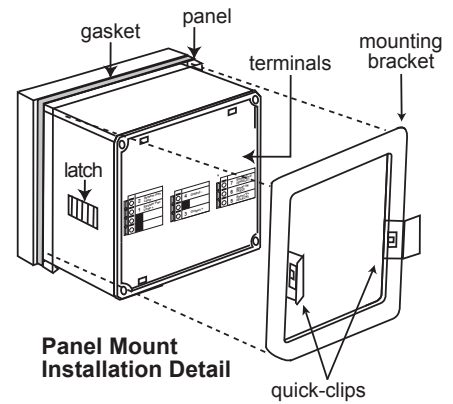
ProcessPro transmitters are available in two styles: panel mount and field mount. The panel mount is supplied with the necessary hardware to install the transmitter. This manual includes complete panel mounting instructions.

Field mounting requires one of two separate mounting kits. The 3-8051 Integral Mounting Kit joins the sensor and instrument together into a single package. The 3-8050 Universal Mounting Kit enables the transmitter to be installed virtually anywhere.

Detailed instructions for integral mounting or other field installation options are included with the 3-8051 Integral Mounting Kit or the 3-8050 Universal Mounting Kit (see Ordering Information).

2.1 Panel Installation

1. The panel mount transmitter is designed for installation using a 1/4 DIN Punch. For manual panel cutout, an adhesive template is provided as an installation guide. Recommended clearance on all sides between instruments is 1 inch.
2. Place gasket on instrument, and install in panel.
3. Slide mounting bracket over back of instrument until quick-clips snap into latches on side of instrument.
4. To remove, secure instrument temporarily with tape from front or grip from rear of instrument. DO NOT RELEASE. Press quick-clips outward and remove.



3. Electrical Connections



Caution: Failure to fully open terminal jaws before removing wire may permanently damage instrument.

Wiring Procedure

1. Remove 0.5 - 0.625 in. (13-16 mm) of insulation from wire end.
2. Press the orange terminal lever downward with a small screwdriver to open terminal jaws.
3. Insert exposed (non-insulated) wire end in terminal hole until it bottoms out.
4. Release orange terminal lever to secure wire in place. Gently pull on each wire to ensure a good connection.



Wiring Removal Procedure

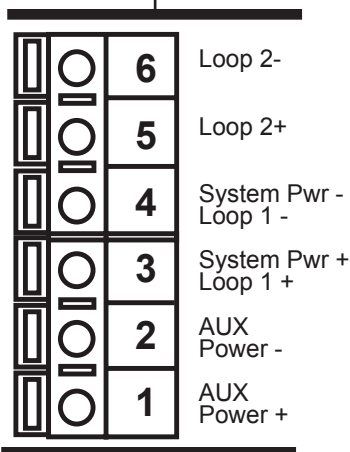
1. Press the orange terminal lever downward with a small screwdriver to open terminal jaws.
2. When fully open, remove wire from terminal.

Terminals 3-6: System Power and Loop Power

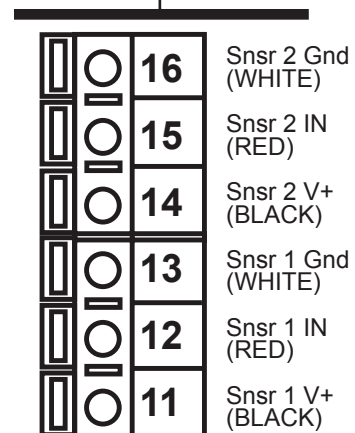
12-24 VDC $\pm 10\%$ system power and current loop outputs.

Max. loop impedance:

- 50 Ω max. @ 12 V
- 325 Ω max. @ 18 V
- 600 Ω max. @ 24 V



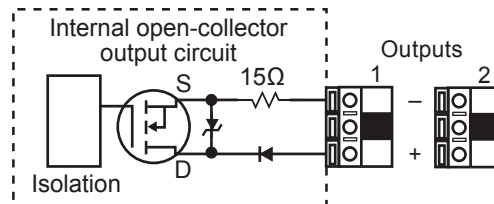
Terminals 11-16: Flow sensor inputs



Terminals 1 and 2: AUXILIARY power

Used only if the flow sensor requires more than 1.5 mA current. For Signet sensors this is limited to the following products:

- 2000 • 2507 • 2551 • 2552
- Open-collector Input signals



Terminals 7-10: Open-collector Outputs

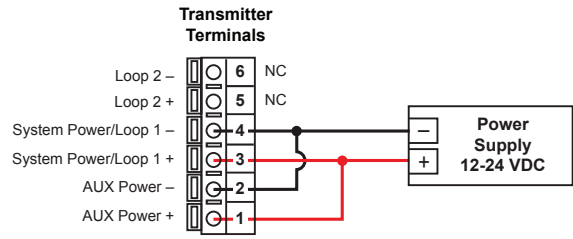
Two transistor outputs, programmable (see CALIBRATE menu) as:

- High or Low setpoint with adjustable hysteresis.
- Pulse based on Volume.
- Frequency based on flow rate.

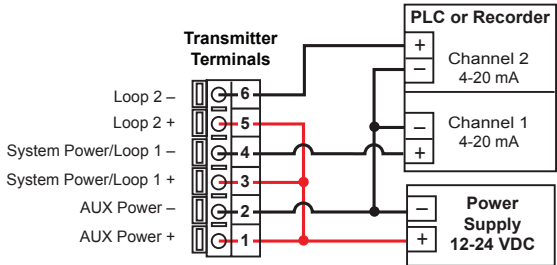
May be disabled (Off) if not used.

3.1 System Power/Loop Connections

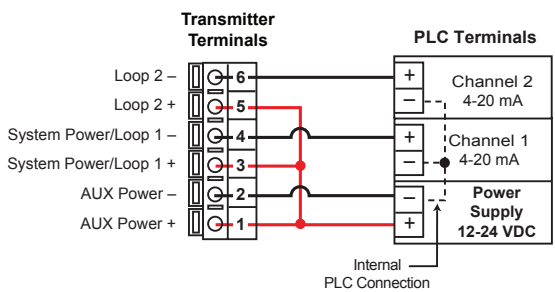
Stand-alone application, no current loop used



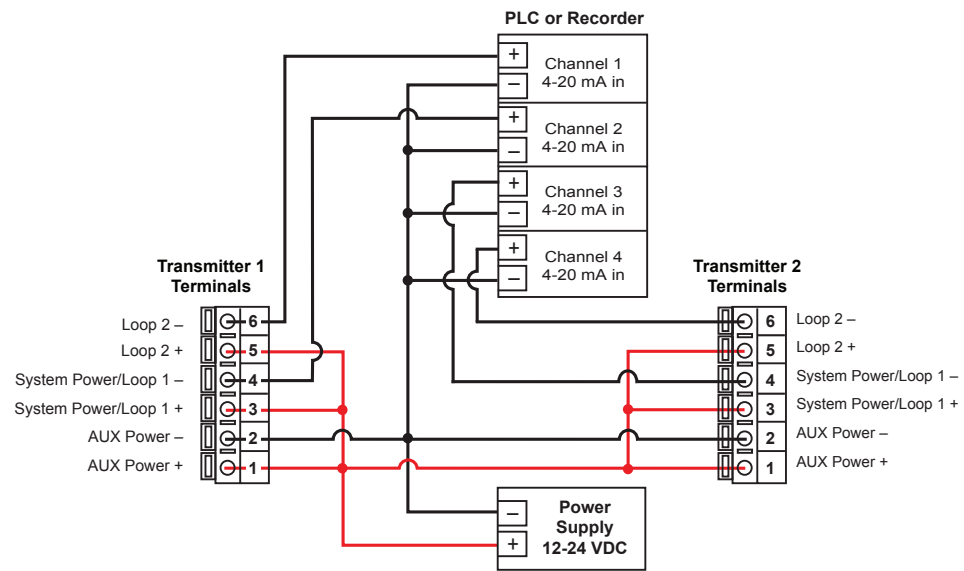
Connection to a PLC/Recorder, separate supply



Connection to a PLC with built-in power supply



Example: Two transmitters connected to PLC/Recorder with separate power supply



Auxiliary Power Note:
Auxiliary power is necessary for flow sensors that require more than 1.5 mA of current.
This includes the following Signet flow sensors: 2000, 2507, 2551, 2552 and all Open Collector signal inputs.

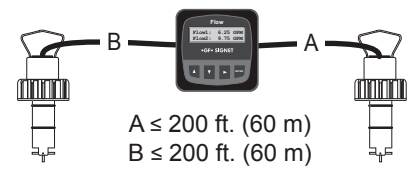
3.2 Sensor Input Connections

Wiring Tips:

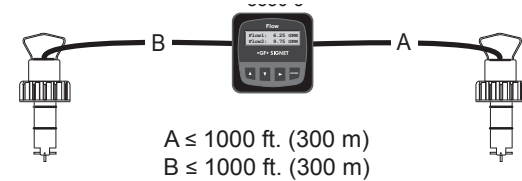
- Do not route sensor cable in conduit containing AC power wiring. Electrical noise may interfere with sensor signal.
- Routing sensor cable in grounded metal conduit will help prevent electrical noise and mechanical damage.
- Seal cable entry points to prevent moisture damage.
- Only one wire should be inserted into a terminal. Splice double wires outside the terminal.

Aux Power Required	No Aux Power	Terminals
2000	515/3-8510-XX	16 Snr 2 Gnd (SHIELD)
2507	525	15 Snr 2 IN (RED)
2551	2100	14 Snr 2 V+ (BLACK)
2552	2536/3-8512-XX	13 Snr 1 Gnd (SHIELD)
Open-collector input signals	2540/2541	12 Snr 1 IN (RED)
		11 Snr 1 V+ (BLACK)

Maximum cable length is 60 m (200 ft.)
for 515/8510-XX, 525 and any sinusoidal
flow signal.



Maximum cable length is 305 m (1000 ft.)
for 2536/8512-XX, 2540/2541 and any
open-collector flow signal.



3.3 Open Collector Output

The Open collector output can be used as a switch that responds when the flow rate moves above or below a setpoint, or it can be used to generate a pulse that is relative to the flow volume or to the flow rate.

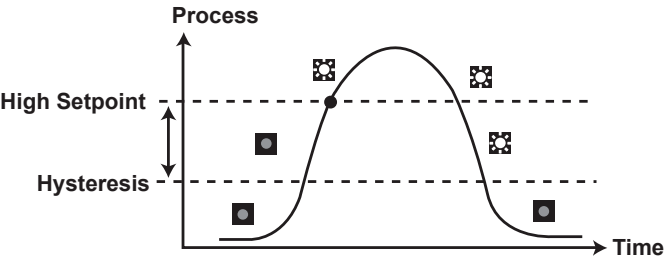
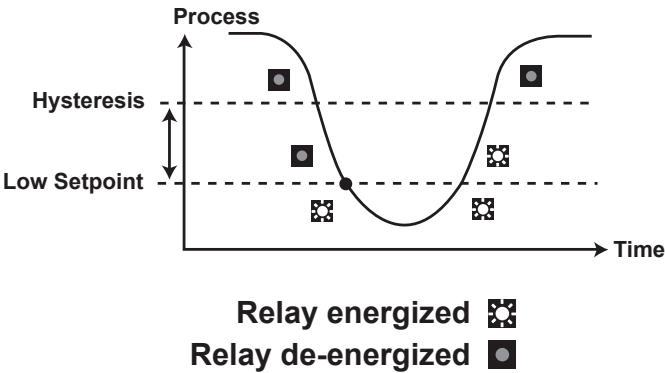
• **Low**
Output energizes when the flow rate is less than the setpoint. The output will de-energize when the flow rate moves above the setpoint plus the hysteresis value.

• **High**
Output energizes when the flow rate is greater than the setpoint. The output will de-energize when the flow rate drops below the setpoint plus the hysteresis value.

• **Frequency**
Output is a pulse stream that is based on the input flow sensor signal. Set for 1 (input frequency = output frequency). Set for even numbers (2, 4, 6, 8, 254 maximum) to scale output frequency.

• **Pulse**
Output is a pulse based on the volume of fluid that passes the sensor. Set any value from 0.0001 to 99999.

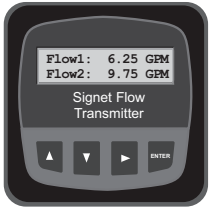
The output may be disabled (Off) if not used.



4. Menu Functions

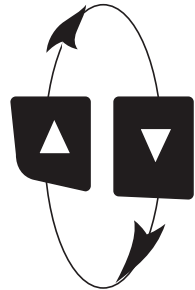
VIEW menu

- During normal operation, ProcessPro displays the VIEW menu.
- When editing the CALIBRATE or OPTIONS menus, ProcessPro will return to the VIEW menu if no activity occurs for 10 minutes.
- To select a VIEW display, press the ▲ or ▼ arrow keys. The selections will scroll in a continuous loop.
- Changing the VIEW display does not interrupt system operations.
- No key code is necessary to change display selection.
- Output settings cannot be edited from the VIEW menu.



View Menu

Display	Description
Flow1: 123.4 GPM Flow2: 567.8 GPM	Monitor the flow rate of Channel 1 and Channel 2 simultaneously. This is the permanent view display.
Delta Flow: 10.5 GPM	Monitor the delta flow rate (Channel 1 rate - channel 2 rate = Delta Flow) This is a permanent display.
All of the displays below are temporary. After 10 minutes the display returns to the permanent display.	
Tot1: 1234567.8 Tot2: 123456.78	Monitor channel 1 and channel 2 Resettable Totalizers. Press the ► key to reset the totalizer. If Reset is locked, you must enter Key Code. Lock or Unlock function is in OPTIONS menu
Perm1: 1234567.8 Gallons	Monitor channel 1 Permanent Totalizer value.
Perm2: 123456.78 Gallons	Monitor channel 2 Permanent Totalizer value.
Loop 1 Output: 12.00 mA Loop 2 Output: 12.00 mA	Monitor the 4 to 20 mA output for Loop 1 and 2.
Last CAL: 02-10-09	Monitor date for scheduled maintenance or date of last calibration. (See description in Calibrate Menu.)



ProcessPro Editing Procedure:

Step 1. Press and hold ENTER key:

- 2 seconds to select the CALIBRATE menu.
- 5 seconds to select the OPTIONS menu.

Step 2. The Key Code is ▲-▲-▲-▼ keys in sequence.

- After entering the Key Code, the display will show the first item in the selected menu.

Step 3. Scroll menu with ▲ or ▼ arrow keys.

Step 4. Press ► key to select menu item to be edited.

- The first display element will begin flashing.

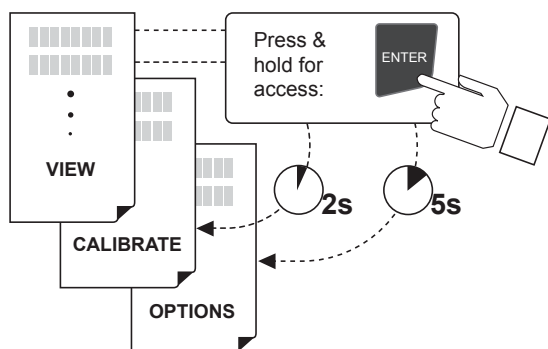
Step 5. Press ▲ or ▼ keys to edit the flashing element.

- ► key advances the flashing element.

Step 6. Press ENTER key to save the new setting and return to Step 3.

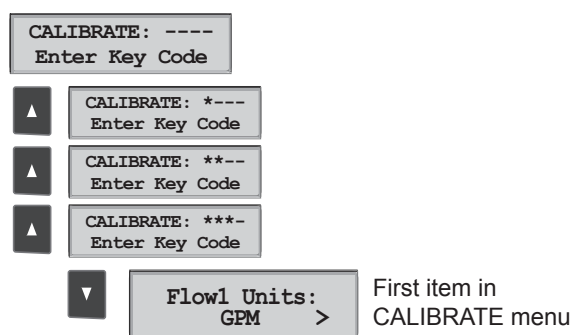
Notes on Step 1:

- The View Menu is normally displayed.
- The CALIBRATE and OPTIONS menus require a KEY CODE.



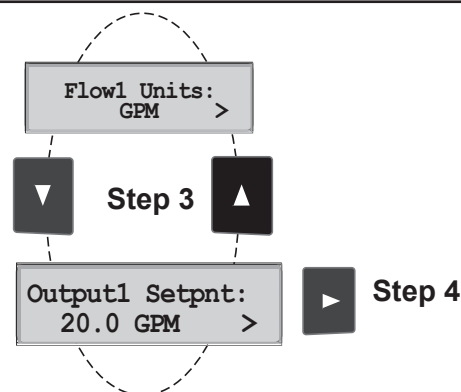
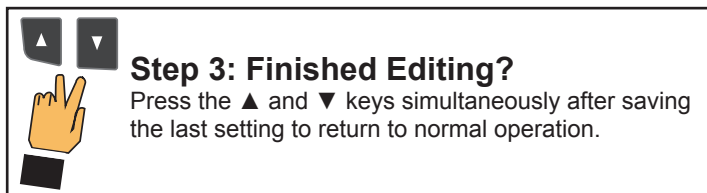
Notes on Step 2:

If no key is pressed for 5 minutes while display is showing "Enter Key Code", the display will return to the VIEW menu.



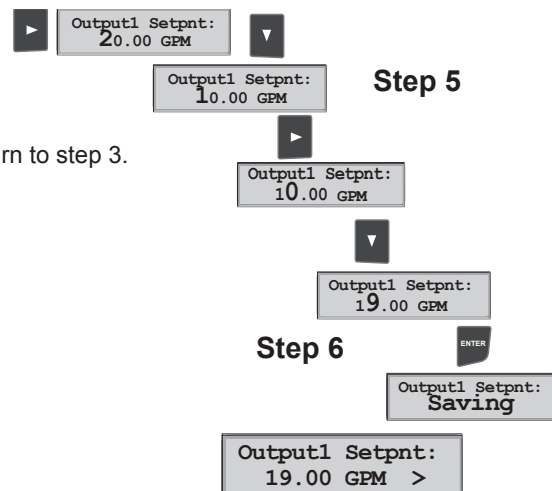
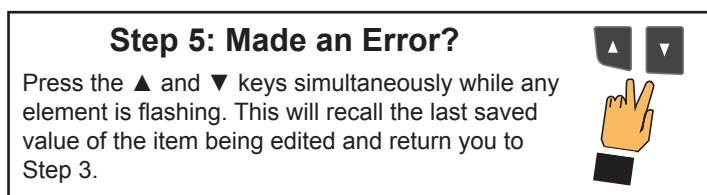
Notes on Steps 3 and 4:

- Refer to pages 6 and 7 for complete listing of menu items and their use.
- From the Step 3 display, pressing the ▲ and ▼ keys simultaneously will return the display to the VIEW menu.
- If no key is pressed for 10 minutes, display will also return to the VIEW menu.



Notes on Steps 5 and 6:

- All output functions remain active during editing.
- Only the flashing element can be edited.
- ► key advances the flashing element in a continuous loop.
- Edited value is effective immediately after pressing ENTER key.
- If no key is pressed for 10 minutes unit will restore the last saved value and return to step 3.
- Step 6 (pressing ENTER key) always returns you to Step 3.
- Repeat steps 3-6 until all editing is completed.



Calibrate Menu

Display (Factory settings shown)	Description
Flow1 Units: GPM >	The first three characters set the Flow Rate units of measure and have no effect on calculations. They may be any character, upper or lower case. The last character sets the Flow rate Timebase. Select S (seconds), M (minutes), H (hours) or D (days)
Flow1 K-Factor: 60.000	This setting converts the input frequency from the flow sensor into a flow rate. The K-Factor is unique to the sensor model and to the pipe size and schedule. Refer to data in the sensor manual for the correct value. Limits: 0.0001 to 99999. (The K-factor cannot be set to 0.)
Total1 Units: Gallons	This setting identifies the Totalizer units. It has no effect on any calculation. It serves as a label only. Each character can be any alpha or numeric selection, upper or lower case.
Total1 K-Factor 60.000 >	This setting converts the input frequency from the flow sensor into a volumetric total. It also is used as the basis for the Open Collector pulse mode. The setting is usually the same as the Flow K-Factor, or different by x10 or x100. Limits: 0.0001 to 99999. (Cannot be set to 0.)
Loop1 Source: Flow1 >	Select the input source to be associated with Loop output #1: Flow sensor #1, Flow sensor #2, or Delta Flow.
Loop1 Range: GPM 000.00 → 100.00 >	Select the minimum and maximum values for the Current loop output #1. The 8550 will allow any values from 0.0000 to 99999
Output1 Source: Flow1 >	Select the desired mode of operation for the Open Collector output. Options available are Flow sensor #1, Flow sensor #2, or Delta Flow.
Output1 Mode: Low >	Select the desired mode of operation for the Open Collector output #1. Options available are High, Low, volumetric Pulse, or Frequency. The signal may be disabled (Off) if not used.
Output1 Setpnt: 10.0 GPM >	In Low or High Mode, the Open Collector output #1 will be activated when the Flow rate reaches this value. Be sure to modify this setting if you change the Flow Units.
Output1 Hys: 5.0 GPM >	The Open Collector output will be deactivated at Setpoint ± Hysteresis, depending on High or Low Setpoint selection. (See details on page 4.)
Output1 Volume: 100.00 Gallons >	In Pulse mode, the Open collector output #1 will generate one pulse when this volume of flow passes the sensor. The measurement is based on the Total K-Factor. The 8550 will allow any value from 0.0001 to 99999.
Output PlsWdth: 0.1 Seconds >	In Pulse mode, this setting defines the duration of the Open Collector output pulse. The 8550 allows any value from 0.1 seconds to 999.9 seconds.
Output1 Freq.: Divide by 1 >	In Frequency mode, the Open Collector output will simulate the sensor frequency, divided by this setting. Set for 1 (input frequency = output frequency). Set for even numbers (2, 4, 6, 8 . . . 254 max) to scale output frequency.
Last CAL: 2-10-09	Use this "note pad" to record important dates, such as annual recertification or scheduled maintenance.

All functions labeled "1" will repeat for channel 2.

Options Menu

Display (Factory settings shown)	Description
Contrast: 3 >	Adjust the LCD contrast for best viewing. A setting of 1 is lowest contrast, 5 is highest. Select lower contrast if the display is in warmer ambient surroundings.
Flow1 Decimal *****. >	Set the decimal to the best resolution for your application. The display will automatically scale up to this resolution. Select *****, *****, ***, **, * or .****
Total1 Decimal *****. ** >	Set the totalizer decimal to the best resolution for your application. Select *****, *****, **, * or .****
Averaging 1: Off >	OFF provides the quickest output response to changes in flow. Longer averaging period produces more stable display and output response. Select OFF, 8 s, 20 s, 50 s or 120 s.
Sensitivity 1: 0 >	Sensitivity works in conjunction with Averaging to balance response time with signal stability. Selections are 0 to 9. Select 0 (zero) for the minimum sensitivity, or 9 for the maximum sensitivity. The function is described below.
Total Reset Lock Off >	Lock Off : No key code required to reset the resettable totalizer. Lock On : The Key Code must be entered to reset the resettable totalizer.
Loop1 Adjust 4.00 mA >	Adjust the minimum and maximum current output. Use this setting to match the system output to any external device. The display value represents the precise current output. Adjustment limits: • 3.80 mA < 4.00 mA > 5.00 mA • 19.00 mA < 20.00 mA > 21.00 mA
Loop1 Adjust 20.00 mA >	
Output1 Active Low >	Active HIGH: This setting is used to turn a device (pump, valve) ON at the setpoint. Active LOW: This setting is used to turn a device OFF at the setpoint.
Test Loop1: >	Press ▲ or ▼ keys to manually order any output current value from 3.6 mA to 21.00 mA to test current loop output.
Test Output 1: >	Press ▲ or ▼ keys to manually toggle the state of open collector output.

All functions labeled "1" will repeat for channel 2.

■■■■■ No AVERAGING, no SENSITIVITY

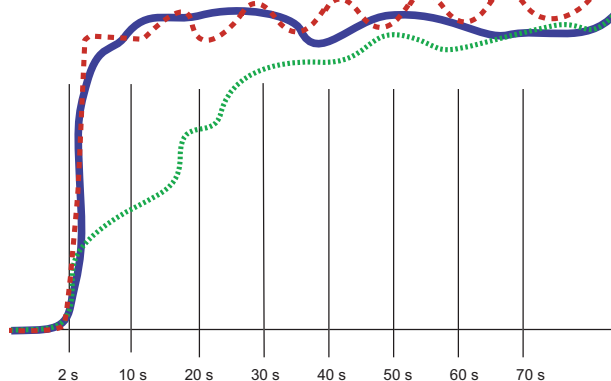
With AVERAGING set to 0 (zero) and with SENSITIVITY set to zero, the 8550 responds to every unstable shift in the flow. The dashed red line represents the actual output of the flow sensor in unstable flow conditions.

..... AVERAGING only

With AVERAGING set to 50 seconds and SENSITIVITY still set to zero the flow rate is stabilized, but a sharp change in flow rate is not represented for 50 seconds or longer (dotted green line).

———— AVERAGING and SENSITIVITY

With AVERAGING at 50 seconds and SENSITIVITY set to 4 OR 5, the flow rate is stabilized, while the sudden shift in flow is reflected very quickly (solid blue line).



NOTE: The SENSITIVITY function is ineffective if the AVERAGING function is set to zero (seconds).

5. Troubleshooting

Display Condition	Possible Causes	Suggested Solutions
- - - - -	Flow rate exceeds display capability	<ul style="list-style-type: none"> • Increase Flow units time base • Move flow decimal one place to the right
Pulse Overrun	<ul style="list-style-type: none"> • Open Collector pulse rate exceeds maximum of 300 pulses per minute. • Pulse width set too wide. 	<ul style="list-style-type: none"> • Increase Pulse volume setting • Decrease pulse width setting. • Reduce system flow rate
Value must be more than 0	K-Factors cannot be set to 0.	Enter K-Factor from 0.0001 to 99999
Open Collector is always activated	<ul style="list-style-type: none"> • Hysteresis value too large • Defective transmitter 	<ul style="list-style-type: none"> • Change the hysteresis value • Replace transmitter

6. Ordering Information

Mfr. Part No.	Code	Description
3-8550-1	159 000 047	Flow transmitter, Field mount
3-8550-1P	159 000 048	Flow transmitter, Panel mount
3-8550-2	159 000 049	Flow transmitter, Field mount with relays
3-8550-2P	159 000 050	Flow transmitter, Panel mount with relays
3-8550-3	159 000 051	Flow transmitter, Field mount with dual input/output
3-8550-3P	159 000 052	Flow transmitter, Panel mount with dual input/output

Accessories

Mfr. Part No.	Code	Description
3-0000.596	159 000 641	Heavy duty wall mount bracket
3-5000.598	198 840 225	Surface Mount Bracket
3-5000.399	198 840 224	5 x 5 inch adapter plate for Signet retrofit
3-8050	159 000 184	Universal mounting kit
3-8050.390-1	159 001 702	Retaining Nut Replacement Kit, NPT, Valox®
3-8050.390-3	159 310 116	Retaining Nut Replacement Kit, NPT, PP
3-8050.390-4	159 310 117	Retaining Nut Replacement Kit, NPT, PVDF
3-8050.391	159 001 703	Retaining Nut Replacement Kit, NPT, Stainless Steel
3-8050.395	159 000 186	Splashproof rear cover
3-8050.396	159 000 617	RC Filter kit (for relay use)
3-8051	159 000 187	Flow Sensor Integral Mounting Kit, NPT, Valox
3-8051-1	159 001 755	Flow Sensor Integral Mounting Kit, NPT, PP
3-8051-2	159 001 756	Flow Sensor Integral Mounting Kit, NPT, PVDF
3-9000.392	159 000 368	Liquid tight connector kit for rear cover (includes 3 connectors)
3-9000.392-1	159 000 839	Liquid tight connector kit, NPT (1 piece)
3-9000.392-2	159 000 841	Liquid tight connector kit, PG13.5 (1 piece)
7300-7524	159 000 687	24 VDC Power Supply 7.5 W, 300mA
7300-1524	159 000 688	24 VDC Power Supply 15 W, 600mA
7300-3024	159 000 689	24 VDC Power Supply 30 W, 1.3 A
7300-5024	159 000 690	24 VDC Power Supply 50 W, 2.1 A
7300-1024	159 000 691	24 VDC Power Supply 100 W, 4.2 A



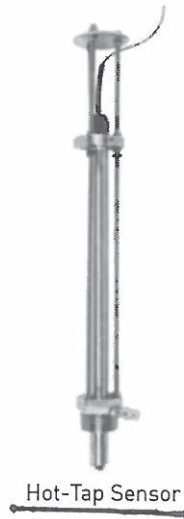
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Signet 2540 Stainless Steel High Performance Paddlewheel Flow Sensor

+GF+



Standard Sensor



Hot-Tap Sensor

The Signet 2540 Paddlewheel Flow Sensor offers the strength and corrosion resistance of stainless steel for liquid applications with low velocity measurements. Unique internal circuitry eliminates the need for magnets in the process fluid, enabling flow measurement of 0.1 to 6 m/s (0.3 to 20 ft/s) while maintaining the advantages of insertion sensor design. Ultraflon 500C bearings and Tungsten Carbide pin provide exceptional wear resistance.

The Signet 2540 offers field replaceable electronics and transient voltage suppression (TVS) to provide greater immunity to large voltage disturbances (i.e. lightning) sometimes encountered in field wiring. Sensors can be installed in DN40 to DN600 (1½ to 24 inch) pipes using the 1½ inch or ISO 7/1-R 1.5 threaded process connection.

The sensors are also offered in a hot-tap configuration with a bleed valve service without process shutdown in pipes up to DN900 (36 in.). Both styles of sensors must be used in full pipes and can be used in low pressure systems.

Features

- Operating range 0.1 to 6 m/s (0.3 to 20 ft/s)
- Field replaceable electronics
- Non-magnetic RF detection
- Standard NPT or ISO process connections
- Hot-tap versions for installation/service without system shutdown
- For pipe sizes up to DN900 (36 in.)
- Adjustable sensor - one size for entire pipe range
- 7.6 m (25 ft) cable



Applications

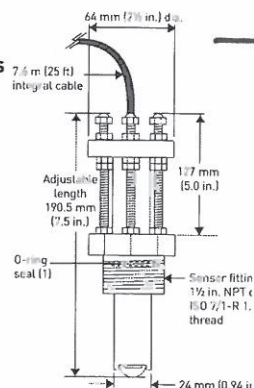
- HVAC
- Turf Irrigation
- Cooling Systems
- Filtration Systems
- Water Distribution
- Leak Detection
- Pump Protection
- Clarified Effluent Totalization
- Ground Water Remediation
- Gravity Feed Line

Specifications

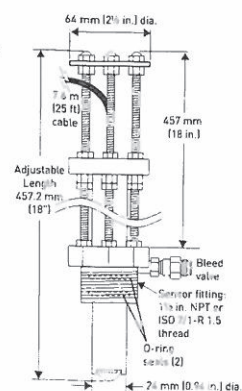
General			
Operating Range	0.1 to 6 m/s	0.3 to 20 ft/s	
Pipe Size Range	Standard Version	DN40 to DN600	1½ to 24 in.
	Hot-Tap Version	DN40 to DN900	1½ to 36 in.
Sensor Fitting Options	1½ in. NPT threads	ISO 7/1-R 1.5 threads	
Linearity	±1% of full range		
Repeatability	±0.5% of full range		
Min. Reynolds Number Required	4500		
Wetted Materials			
Body	316 stainless steel (1.4401)		
Fitting	316 stainless steel (1.4401)		
Fitting O-rings	FPM, optional EPR (EPDM)		
Rotor	17-4 SS Alloy		
Rotor Pin	Tungsten Carbide GRP 1 (standard) stainless steel (optional)		
Retainers (2)	316 stainless steel (1.4401)		
Rotor Bearings (2)	Carbon fiber reinforced PTFE		
Electrical			
Frequency	15 Hz per ft/s nominal		
Power	5 to 24 VDC ±10%, regulated, 1.5 mA max.		
Output Type	Open collector, sinking, max 10.0 mA		
Cable Length	7.6 m (25 ft), can be extended up to 300 m (1,000 ft)		
Cable Type	2-conductor twisted-pair with shield, 22 AWG		
Max. Temperature/Pressure Rating			
Sensor with standard FPM sensor fitting O-rings	17 bar @ 82 °C	250 psi @ 180 °F	
Sensor with optional EPR (EPDM) sensor fitting O-rings	17 bar @ 100 °C	250 psi @ 212 °F	
Operating Temperature	-18 °C to 100 °C	0 °F to 212 °F	
Shipping Weight			
	3-2540-1/-2/-1S/-2S	1.79 kg	3.9 lb
	3-2540-3/-4/-3S/-4S	2.15 kg	4.7 lb
Standards and Approvals			
	CE		
	RoHS compliant, China RoHS		
	Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management		

Dimensions

2540 High Performance
Flow Sensor for 1½ to 24 in. pipes

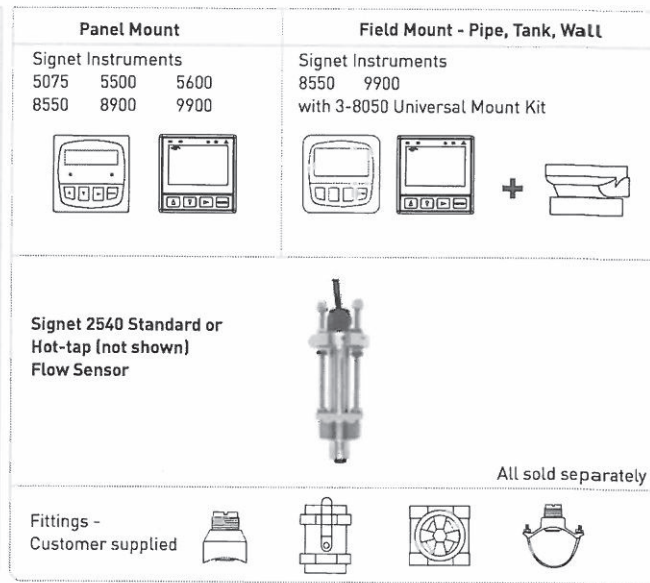


2540 Hot-Tap for
1½ to 36 in. pipes



See Temperature and Pressure graphs for more information.

System Overview



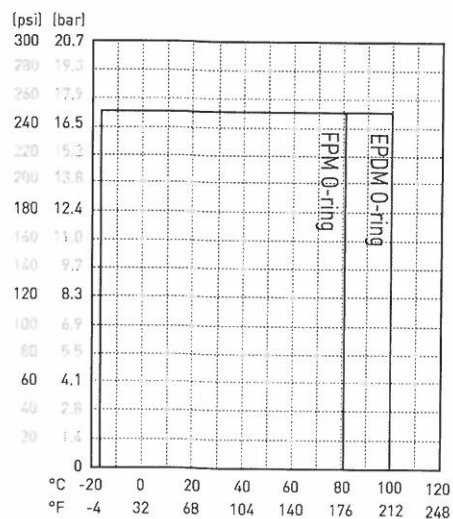
Application Tips

- For systems with components of more than one material, the maximum temperature/pressure specification must always be referenced to the component with the lowest rating.
- Use the Conduit Adapter Kit to protect the cable-to-sensor connection when used in outdoor environments.
- Sensor electronics can be easily replaced by 3-2541.260-1 or 3-2541.260-2.

Operating Temperature/Pressure Graphs

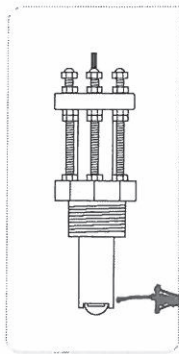
Note:

The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.



Please refer to Wiring, Installation, and Accessories sections for more information.

Ordering Information



Mfr. Part No.	Code	Mounting Option	Rotor Pin Material
Stainless Steel High Performance flow sensor with removable electronics			
3-2540-1	198 840 035	1½ inch NPT thread	Tungsten Carbide
3-2540-2	198 840 036	1½ inch ISO thread	Tungsten Carbide
3-2540-3	198 840 037	1½ inch NPT thread, Hot-Tap design*	Tungsten Carbide
3-2540-4	198 840 038	1½ inch ISO thread, Hot-Tap design*	Tungsten Carbide
3-2540-1S	159 001 501	1½ inch NPT thread	316 Stainless Steel
3-2540-2S	159 001 502	1½ inch ISO thread	316 Stainless Steel
3-2540-3S	159 001 503	1½ inch NPT thread, Hot-Tap design*	316 Stainless Steel
3-2540-4S	159 001 504	1½ inch ISO thread, Hot-Tap design*	316 Stainless Steel

*Must use 3-1500.663 Hot-Tap installation tool (ordered separately)

Ordering Notes

Installation fittings and Hot-Tap valves are customer supplied.

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
3-1500.663	198 820 008	Hot-Tap Installation Tool (see Installation for more info)
1220-0021	198 801 186	O-ring, FPM (2 required per sensor)
1224-0021	198 820 006	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	198 820 007	O-ring, FFPM (2 required per sensor)
3-2540.320	198 820 040	Rotor kit, 2540 PEEK Bearing (old version)
3-2540.321	159 000 623	Rotor kit, 2540 Tungsten Carbide Pin (new version since January 1, 2000)
3-2540.322	159 000 864	Rotor kit, stainless steel pin and rotor
P52504-3	159 000 866	Rotor pin, Tungsten Carbide
P52504-4	159 000 867	Rotor pin, 316 SS
P52503	198 820 013	Bearing, carbon reinforced PTFE
P52527	159 000 481	Retainers, SS (1.4401)
3-2541.260-1	159 000 849	Standard replacement electronics module
3-2541.260-2	159 000 850	Hot-Tap replacement electronics module
5523-0222	159 000 392	Cable (per foot), 2 cond. w/shield, 22 AWG
P51589	159 000 476	Conduit adapter kit
P31934	159 000 466	Conduit cap

3-2540.099 Rev C (10/11)

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www.gfsignet.com



3-2540.090 E 03/09 English

For the most up-to-date information, please refer to our website at www.gfsignet.com



SAFETY INSTRUCTIONS

1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Wear safety goggles or faceshield during installation/service.
4. Do not alter product construction.
5. Apply sealant or PTFE tape to sensor threads, inspecting threads to ensure integrity. Do not install a sensor with damaged threads.



Pipe fittings **MUST** be installed by a certified welder only. Signet will not assume liability of any kind for improper fitting installations.



2540 Hot-Tap sensor specifications and limitations depend on the lowest maximum rating of the components associated with the system. For example, if a ball valve in the system is rated at a maximum 100 psi @ 175°F, you must limit the entire system's maximum pressure/temperature rating to 100 psi @ 175°F. All higher maximum specifications **MUST** yield to the component with the lowest maximum specification.



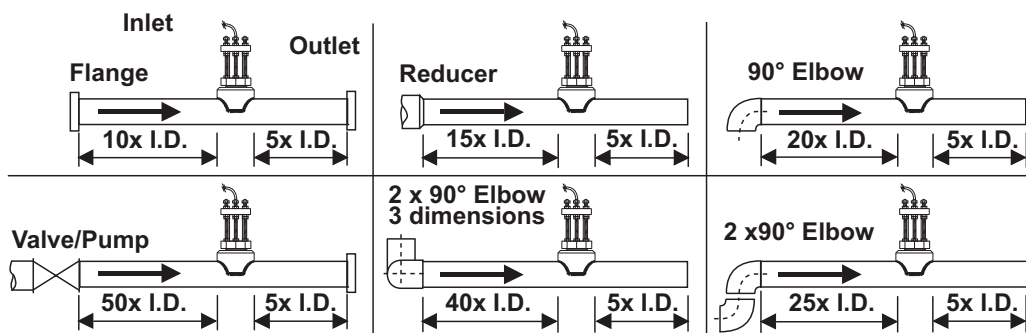
Maximum Operating Pressure/Temperature:

- 17 bar (250 psi) @ 82°C (180°F) with standard FPM sensor fitting O-rings.
- 17 bar (250 psi) @ 100°C (212°F) with optional EPDM sensor fitting O-rings.

Note: Pressure/temperature specifications refer to sensor performance in water. Certain chemical limitations may apply. Chemical compatibility should be verified.

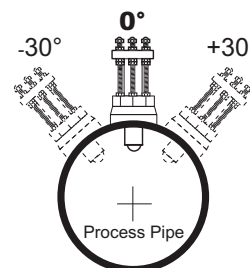
1. Location of Fitting

Recommended sensor upstream/downstream mounting requirements.



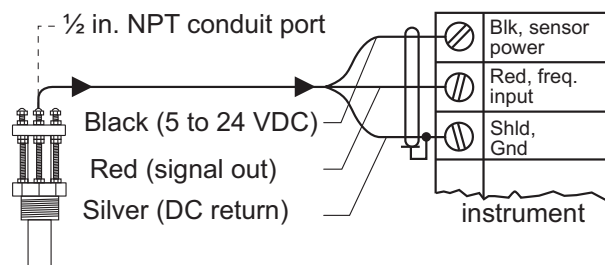
2. Sensor Mounting Position

Vertical mounting is recommended for best overall performance. Mount at a maximum of 30° when air bubbles are present. **DO NOT** mount on the bottom of the pipe when sediments are present.

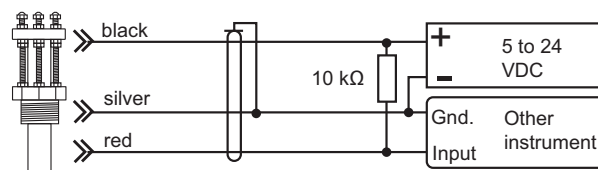


3. Sensor Wiring

Signet Instruments



Other Brands



- pull-up resistor required (10 kΩ recommended).
- Use 2-conductor shielded cable for cable extensions up to 300m (1000 ft.).
- Maintain cable shield through splice.

- Use 2-conductor shielded cable for cable extensions up to 300m (1000 ft.).
- Maintain cable shield through splice.

4. Electronics Module Installation and Removal

The electronics module of this sensor can be replaced without removing the steel sensor body from the line.

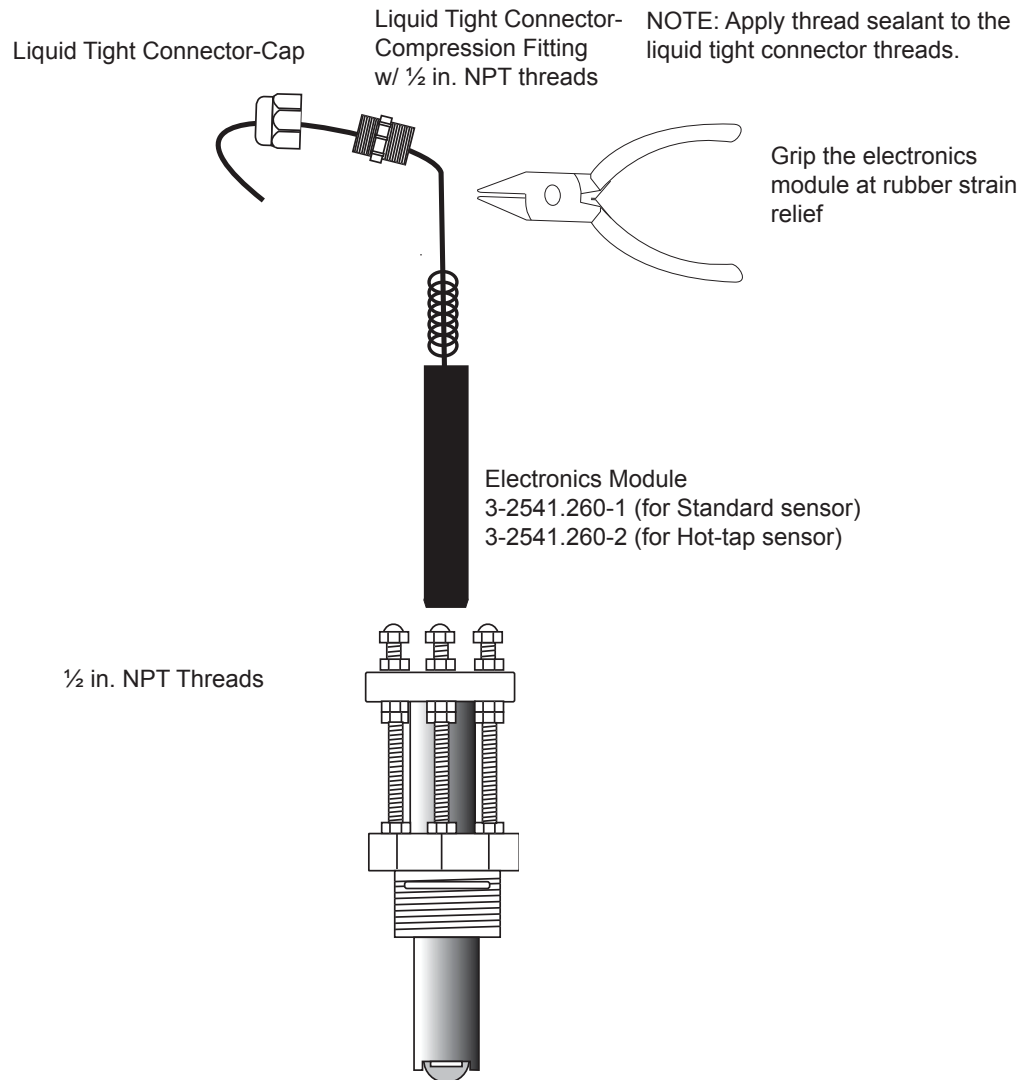
1. Loosen liquid tight connector cap.
2. Loosen liquid tight connector compression fitting from sensor body.
3. Grasp the electronics at the rubber strain relief (do not pull on cable) and pull firmly.

To reinstall the electronics module:

- Insert module into sensor housing, making sure module is fully seated.
The tip of the electronic module must bottom-out in the sensor housing.
- Replace the liquid tight connector assembly.

NOTE: Apply thread sealant to the liquid tight connector threads.

To install the cable inside protective conduit, remove the liquid tight connector completely. Thread ½ in. conduit into top of sensor body.



5. Installation

The following items are required to properly install Signet 2540 Sensors.

5.1 Hardware, Standard Sensor

- Female pipe fitting (weld-on or saddle) with 1½ in. NPT or ISO 7-Rc 1½ threads
- 32 mm (1¼ in.) diameter drill
- Pipe thread sealant
- Tape measure

5.2 Hardware, Hot-Tap Sensor

The Hot-Tap sensor requires all the standard sensor items plus:

- Hot-Tap drilling machine (e.g., Mueller drilling machine or equivalent)
- Female ball or gate valve (full port only) with 1½ in. NPT or ISO 7-Rc 1½ threads
- Male pipe nipple, 32 x 50 mm (1½ x 2 in.) with 1½ in. NPT or ISO 7-R 1½ threads
- Hot-Tap installation tool (purchased separately)

5.3 Standard Fitting Installation

- Depressurize and drain pipe.
- Wearing safety face protection, drill a 32 mm (1¼ in.) diameter hole in the pipe.
- Install the pipe fitting of the outside of the pipe according to the manufacturer's instructions. Failure to follow these instructions may result in serious bodily injury and/or product failure.
- Remove sensor fitting from sensor assembly.
- Thread sensor fitting into pipe fitting. (Fig. 1)

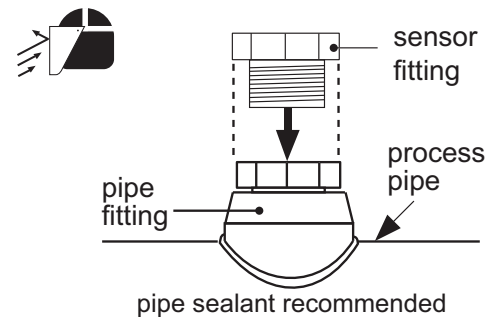


Fig. 1

5.4 Hot-Tap Fitting Installation

- Install the pipe fitting on the outside diameter of the pipe according to the manufacturer's instructions. Failure to follow these instructions may result in serious bodily injury and/or product failure.
- Install the pipe nipple and isolation valve (ball or gate valve) onto the external pipe fitting using pipe sealant on the threads. (Fig. 2)
- Wearing safety face protection, install an appropriate hole cutting tool per manufacturer's instructions (e.g., Mueller drilling machine) with a 32 mm (1.25 in.) drill onto the top of the isolation valve, ensuring a tight fit. **Use the recommended drill bit size or damage to the isolation valve may occur.**
- Open the isolation valve and insert the drill through the valve and cut the sensor clearance hole. After the hole is cut, withdraw the drill from the isolation valve and close the valve. Remove the drilling machine per manufacturer's instructions. (Fig. 3)
- Install the sensor fitting/bleed valve into the top of the isolation valve. Make sure the bleed valve clears the handle of the isolation valve during operation.

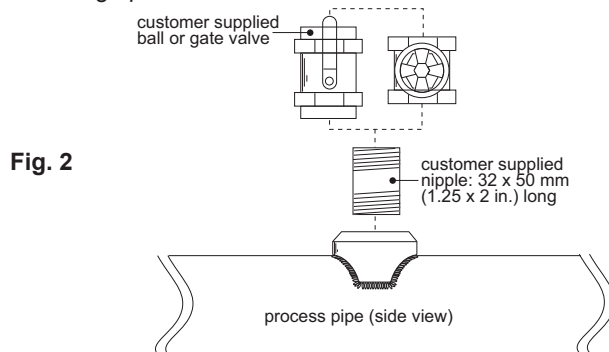


Fig. 2

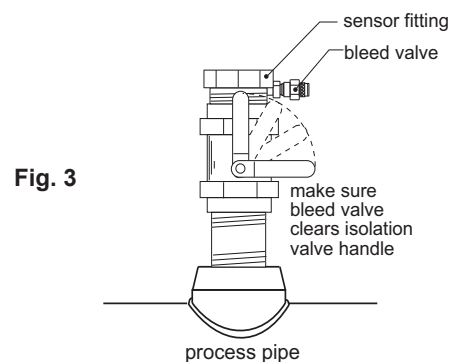


Fig. 3

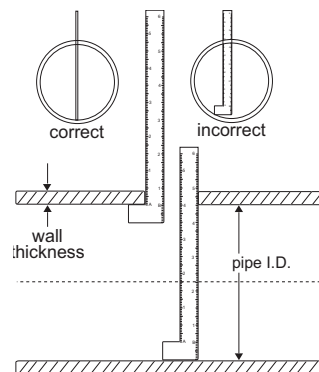
5.5 Calculating the H Dimension

Before installing the sensor some critical dimensions must be established (for Hot-Tap installations, we assume the pipe dimensions are known). The rotor shaft must be located 10% inside the pipe I.D. to ensure accurate calibration capability. To accomplish this, the "H" dimension is measured from the outside surface of the pipe to the bottom of the sensor flange.

Nominal "H" dimensions for standard pipes are listed here. For non-standard pipe dimensions, calculate the "H" dimension using the formula listed below. The wall thickness and inside diameter (I.D.) are required for the "H" dimension calculation.

The 6 inch ruler (included) may be used to measure your pipe I.D. and wall thickness up to 5 inches (standard sensors only).

Pipe wall thickness: _____ Pipe I.D.: _____



H Dimensions, Standard Sensors (2540-1, 2540-2)

(-----) unavailable

Wrought Steel Pipe Per ANSI 36.10

NPS inches	SCH 40 inches	SCH 80 inches	STD inches	XS inches
1½	4.924	4.880	4.924	4.880
2	4.869	4.818	4.869	4.818
2½	4.780	4.722	4.780	4.722
3	4.707	4.640	4.707	4.640
3½	4.649	4.576	4.649	4.576
4	4.590	4.510	4.590	4.510
5	4.467	4.374	4.467	4.374
6	4.344	4.222	4.344	4.222
8	4.110	3.968	4.110	3.968
10	3.863	3.680	3.863	3.755
12	3.630	3.405	3.655	3.555
14	3.480	3.230	3.530	3.430
16	3.230	2.955	3.330	3.230
18	2.980	2.680	3.130	3.030
20	2.755	2.405	2.930	2.830
22	-----	2.130	2.730	2.630
24	2.280	1.855	2.530	2.430

Stainless Steel Pipe Per ANSI B36.19

NPS inches	SCH 5S inches	SCH 10S inches	SCH 40S inches	SCH 80S inches
1½	4.988	4.953	4.924	4.880
2	4.940	4.905	4.869	4.818
2½	4.876	4.847	4.780	4.722
3	4.814	4.784	4.707	4.640
3½	4.764	4.734	4.649	4.576
4	4.714	4.684	4.590	4.510
5	4.586	4.567	4.467	4.374
6	4.480	4.460	4.344	4.222
8	4.280	4.249	4.110	3.968
10	4.048	4.023	3.863	3.755
12	3.830	3.811	3.655	3.555
14	3.705	3.680	-----	-----
16	3.498	3.480	-----	-----
18	3.298	3.280	-----	-----
20	3.080	3.056	-----	-----
22	2.880	2.856	-----	-----
24	2.656	2.630	-----	-----

H Dimensions, Hot-Tap Sensors (2540-3, 2540-4)

(-----) unavailable

Wrought Steel Pipe Per ANSI 36.10

NPS inches	SCH 40 inches	SCH 80 inches	STD inches	XS inches
1 ½	15.084	15.040	15.084	15.040
2	15.029	14.978	15.029	14.978
2 ½	14.940	14.882	14.940	14.882
3	14.867	14.800	14.867	14.800
3½	14.809	14.736	14.809	14.736
4	14.750	14.670	14.750	14.670
5	14.627	14.534	14.627	14.534
6	14.534	14.382	14.534	14.382
8	14.270	14.128	14.270	14.128
10	14.023	13.840	14.023	13.915
12	13.790	13.565	13.815	13.715
14	13.640	13.390	13.690	13.590
16	13.390	13.115	13.490	13.390
18	13.140	12.840	13.290	13.190
20	12.915	12.565	13.090	12.990
22	-----	12.290	12.890	12.790
24	12.440	12.015	12.690	12.590

Stainless Steel Pipe Per ANSI B36.19

NPS inches	SCH 5S inches	SCH 10S inches	SCH 40S inches	SCH 80S inches
1 ½	15.148	15.113	15.084	15.040
2	15.101	15.065	15.029	14.978
2 ½	15.036	15.007	14.940	14.882
3	14.974	14.944	14.867	14.800
3 ½	14.924	14.894	14.809	14.736
4	14.874	14.844	14.750	14.670
5	14.747	14.727	14.627	14.534
6	14.640	14.620	14.534	14.382
8	14.440	14.409	14.270	14.128
10	14.208	14.183	14.023	13.915
12	13.990	13.971	13.815	13.715
14	13.865	13.840	-----	-----
16	13.658	13.640	-----	-----
18	13.458	13.440	-----	-----
20	13.240	13.216	-----	-----
22	13.040	13.016	-----	-----
24	12.816	12.790	-----	-----

Standard Sensors: H = 5.23 - wall thickness - (0.10 x I.D.)

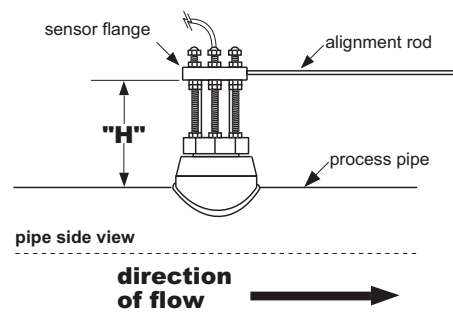
Hot-Tap Sensors: H=15.39 in. - wall thickness - (0.10 x I.D.)

Example: 3.0 inch schedule 80 wrought steel
Wall thickness = 0.3 in. / Inside diameter = 2.9 in.

$H = 5.23 - 0.3 - (0.10 \times 2.9) / H = 117.86 \text{ mm (4.64 in.)}$

Record your sensor's "H" dimension for future reference: **H=** _____

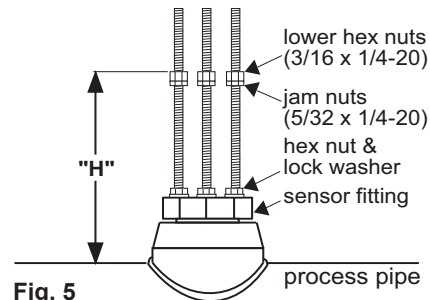
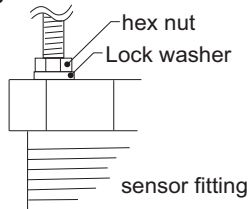
After correct dimensions are calculated and recorded, the sensor can be installed in the fitting. The Standard and Hot-Tap versions require substantially different procedures.



5.6 Standard Sensor Installation

- Thread one hex nut onto each of the three threaded rods included in package. Install threaded rod with a lock washer onto the sensor fitting. Secure rods in place by tightening each hex nut against the sensor fitting. (Fig. 4)
- Thread one jam nut and lower hex nut onto each threaded rod so that the top surface of each nut is at the proper "H" dimension for your pipe. Secure each hex nut with a jam nut. (Fig. 5)
- Insert the flow sensor into the sensor fitting, making sure the alignment hole on the sensor flange is pointing downstream. (Fig. 6)

Fig. 4



- Place the alignment rod in the alignment hole on the sensor flange. Align the flange so rod is parallel to the process pipe. (Fig. 6)
- Thread upper hex nuts with lock washers until they contact the sensor flange and tighten. Check for proper "H" dimension and readjust if necessary. (Fig. 7)

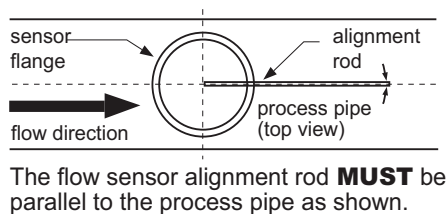


Fig. 6

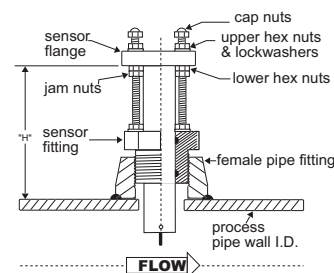


Fig. 7

5.7 Hot-Tap Sensor Installation

- Thread one hex nut onto each of the three threaded rods included in package. Install threaded rod with a lock washer onto the sensor fitting. Secure rods in place by tightening each hex nut against the sensor fitting. (Fig. 8)
- Thread one jam nut and lower hex nut onto each threaded rod so that the top surface of each nut is 359 mm (14.14 in.) from the top surface of the sensor fitting. Secure each hex nut with a jam nut. (Fig. 9)



CAUTION: This setting is critical to ensure an adequate sensor seal and to prevent the rotor from hitting the isolation valve orifice during installation.

- Wipe the sensor body with a dry, clean cloth. Orient the alignment hole on the sensor flange to point **downstream**. Place the slotted flange over the threaded rods. Lower the sensor into the fitting until the sensor flange rests on the lower hex and jam nuts. (Fig. 10)
- Secure the sensor with lock washers and upper hex nuts on the top of the flange. Before tightening, align the sensor flange so that the alignment rod is parallel and level with the process pipe. (Fig. 10 & Fig. 11)
- Make sure the bleed valve is closed (full clockwise position).

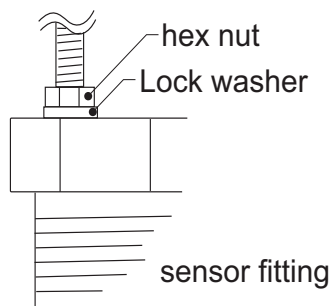


Fig. 8

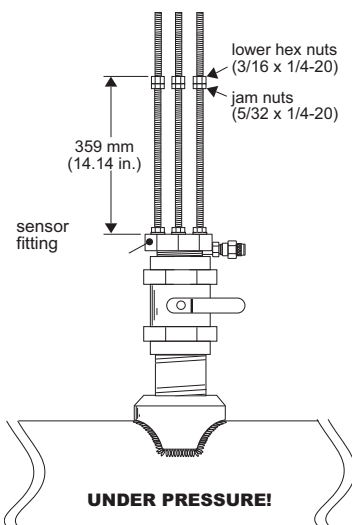


Fig. 9

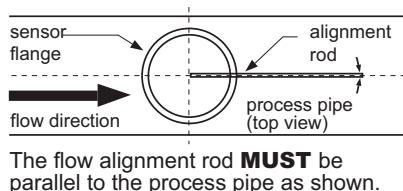


Fig. 10

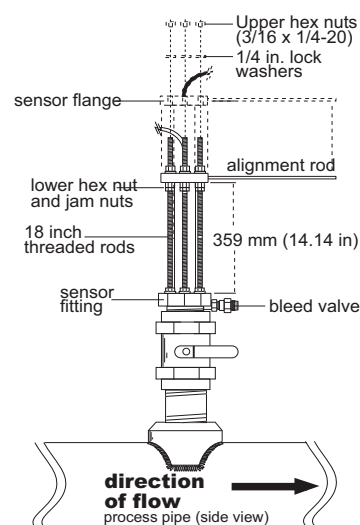


Fig. 11

- F. Thread protector plate hex nuts onto each of the three threaded rods. Adjust each hex nut to a height of approximately 25 mm (1 in.) from the top of each rod. (Fig. 12)

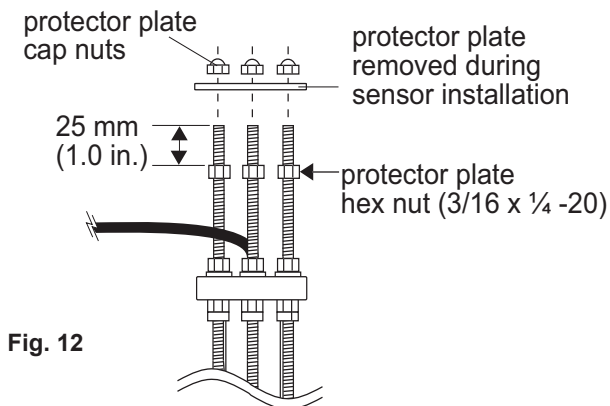


Fig. 12

- G. Position the installation tool bearing plate by rotating it so that it is approximately 40 mm (1.6 in.) from the swivel mount. Mount the installation tool by placing the threaded rods through the holes in the tool's bearing plate, resting the bearing plate on top of the protector plate hex nuts. Make sure the swivel mount's ears are mounted **between** the threaded rods (not over the rods). Install the bearing plate cap nuts. Tighten the bearing plate cap nuts to secure the installation tool in place. (Fig. 13)
- H. Align the sensor cable with the swivel mount cable port to prevent cable pinching. Use a 3/8 inch wrench or socket to turn the installation tool shaft clockwise until it is seated in the hole at the top of the sensor flange.
- I. Wearing safety face protection, **slowly open the isolation valve to the full open position**. Loosen the lower hex and jam nuts and move them to the proper "H" dimension. Turn the installation tool shaft **clockwise** until the sensor flange contacts the lower hex and jam nuts. Thread the upper hex nuts down until they contact the sensor flange. Tighten the upper hex nuts to secure the sensor. (Fig. 14)
- J. Remove cap nuts and withdraw the installation tool. Be careful to not damage cable. Replace protector plate and cap nuts. (Fig. 15)



Fig. 13

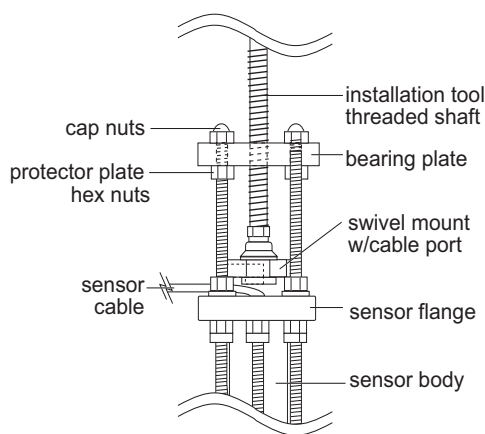


Fig. 14

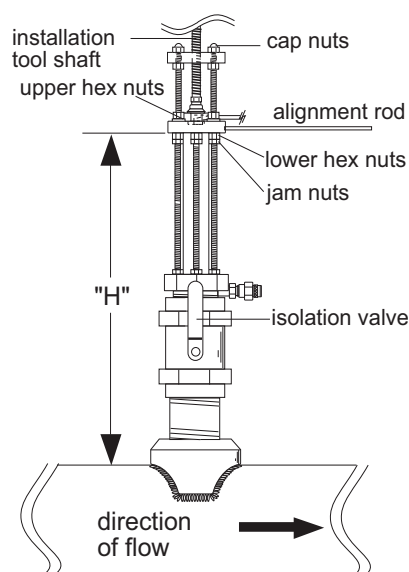
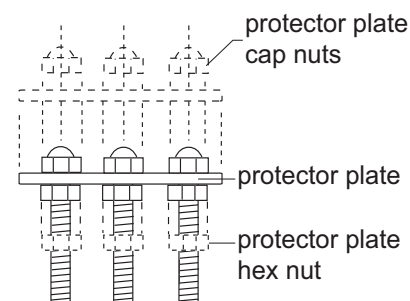


Fig. 15



6. Standard Sensor Removal

To remove the sensor from a **depressurized empty pipe**, simply remove the cap nuts and upper hex nuts located above the sensor flange. Pull up on sensor flange with twisting motion.

7. Hot-Tap Sensor Removal

To remove the Hot-Tap sensor safely from a pressurized active pipe, the entire installation process must be reversed.

- Remove the cap nuts, protector plate and protector plate hex nuts. (Fig. 16)
- Thread installation tool in place and secure bearing plate in place of sensor protector plate. (Fig. 17)
- Turn shaft of installation tool **clockwise** to lower tool into opening in sensor flange. Guide cable into the port to prevent damage.

Fig. 16

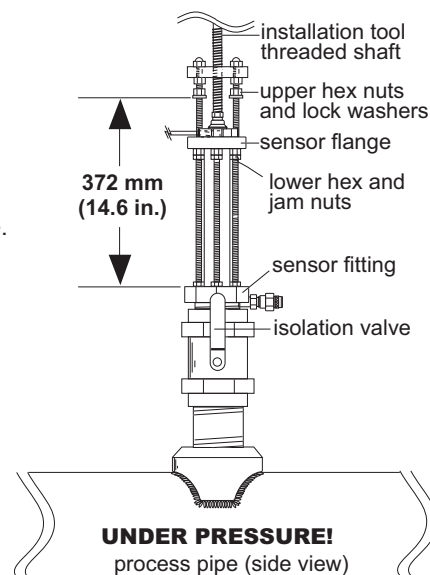
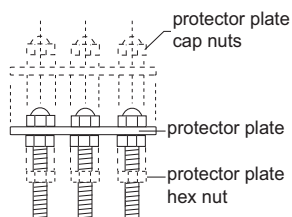


Fig. 17

- Wearing safety face protection, loosen the upper hex nuts and raise to 372 mm (14.6 in.) from top of sensor fitting to bottom of upper hex nuts/lock washers. **CAUTION! This measurement is critical to maintain watertight seal in sensor while allowing clearance to close the isolation valve.**

- Wearing safety face protection, turn the installation tool shaft **counterclockwise** to withdraw sensor until the sensor flange contacts the upper hex nuts. (Fig. 18)



- Raise **one** lower hex and jam nut to bottom of sensor flange.

- Close isolation valve, remove bearing plate and tool.

- Wearing safety face protection, cover the bleed valve with suitable protection (rag, towel, etc.) and open the bleed valve (ccw rotation) to relieve internal pressure. Pull sensor up until bleed valve purges some fluid (indicating sensor is past 1st o-ring seal inside sensor fitting).

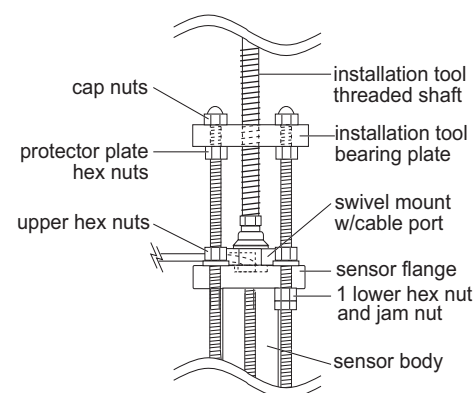


Fig. 18



CAUTION: In case of a leaky isolation valve, the sensor will be under a slight amount of pressure. Care should be taken when removing the sensor. Use the bleed valve to relieve this pressure taking care not to spray fluid on yourself or others.

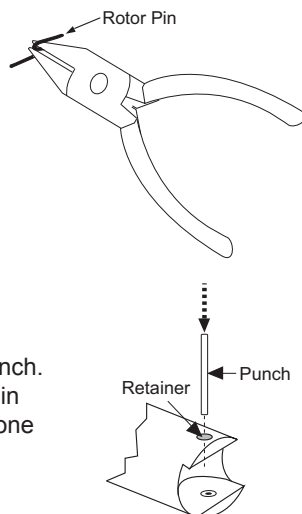
Sensor can now be safely removed. When reinstalling the sensor: leave one lower hex nut in position to guide sensor to proper isolation valve clearance height before opening isolation valve. Return to "H" dimension height after valve is opened.

8. Maintenance

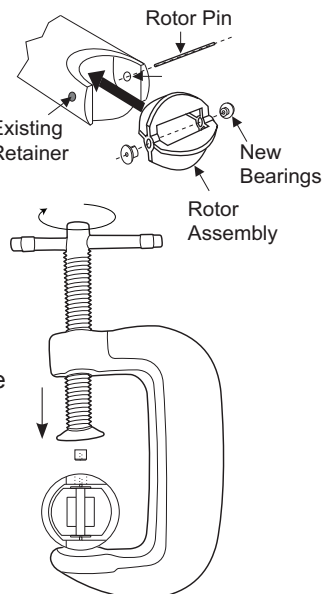
Your sensor requires little or no maintenance of any kind, with the exception of an occasional sensor/paddlewheel cleaning.

Rotor Replacement Procedure

- With a small pair of needle-nose pliers, firmly grip the center of the rotor pin (axle) and with a twisting motion, bend the rotor pin into an "S" shape. This should pull the ends of the pin out of the retainers and free the rotor assembly.
- Remove retainer from each side by gently tapping it inwards using a punch. Install a new retainer with its rotor pin clearance hole inward. Only install one retainer at this time.



- Insert the new rotor assembly and bearings into the rotor housing of the sensor and place the new rotor pin (axle) through the open end of the rotor housing, through the rotor and bearings, and into the previously installed retainer.



- Using a vise or C-clamp, press the second retainer into the hole in the sensor body while lining up the rotor pin with the center of the retainer hole.

Note: A hammer and center punch can also be used if a clamp or vise is not available.

9. K-Factors (Stainless Steel, Wrought Steel & Plastic Pipe)

SCH 5S STAINLESS STEEL PIPE PER ANSI B36.19

PIPE SIZE	K-Factor PULSES/ U.S. GAL	K-Factor PULSES/ LITER
1½ in.	115.1900	30.433
2 in.	71.3960	18.863
2 ½ in.	49.263	13.015
3 in.	32.636	8.622
3 ½ in.	24.537	6.483
4 in.	19.1350	5.055
5 in.	12.4490	3.289
6 in.	8.4602	2.235
8 in.	4.9137	1.298
10 in.	3.1228	0.825
12 in.	2.1772	0.575
14 in.	1.7977	0.475
16 in.	1.3717	0.362
18 in.	1.0855	0.287
20 in.	0.8801	0.233
22 in.	0.7293	0.193
24 in.	0.6141	0.162

XS WROUGHT STEEL PIPE PER ANSI B36.10

PIPE SIZE	K-Factor PULSES/ U.S. GAL	K-Factor PULSES/ LITER
1 ½ in.	161.79	42.745
2 in.	95.713	25.287
2 ½ in.	66.686	17.618
3 in.	42.986	11.357
3 ½ in.	31.983	8.450
4 in.	24.668	6.517
5 in.	15.480	4.090
6 in.	10.691	2.825
8 in.	5.9733	1.578
10 in.	3.6489	0.964
12 in.	2.4548	0.649
14 in.	1.9931	0.527
16 in.	1.4970	0.396
18 in.	1.1727	0.310
20 in.	0.9388	0.248
22 in.	0.7685	0.203
24 in.	0.6446	0.170

SCH 40S STAINLESS STEEL PIPE PER ANSI B36.19

PIPE SIZE	K-Factor PULSES/ U.S. GAL	K-Factor PULSES/ LITER
1 ½ in.	140.030	36.996
2 in.	83.240	21.992
2 ½ in.	59.034	15.597
3 in.	38.675	10.218
3 ½ in.	28.752	7.596
4 in.	22.226	5.872
5 in.	14.061	3.715
6 in.	9.5160	2.514
8 in.	5.4523	1.441
10 in.	3.4507	0.912
12 in.	2.3318	0.616

SCH 40 STAINLESS STEEL PIPE

14 in.	1.9556	0.517
16 in.	1.4970	0.396
18 in.	1.1900	0.314
20 in.	0.9577	0.253
24 in.	0.6662	0.176

SCH 10S STAINLESS STEEL PIPE PER ANSI B36.19

PIPE SIZE	K-Factor PULSES/ U.S. GAL	K-Factor PULSES/ LITER
1½ in.	127.930	33.799
2 in.	76.439	20.195
2 ½ in.	51.946	13.724
3 in.	34.174	9.029
3½ in.	25.571	6.756
4 in.	19.829	5.239
5 in.	12.730	3.363
6 in.	8.5938	2.270
8 in.	5.0062	1.323
10 in.	3.1793	0.840
12 in.	2.1914	0.579
14 in.	1.8147	0.479
16 in.	1.3798	0.365
18 in.	1.0912	0.288
20 in.	0.8855	0.234
22 in.	0.7334	0.194
24 in.	0.6175	0.163

STD WROUGHT STEEL PIPE PER ANSI B36.10

PIPE SIZE	K-Factor PULSES/ U.S. GAL	K-Factor PULSES/ LITER
1 ½ in.	140.030	36.996
2 in.	83.240	21.992
2 ½ in.	59.034	15.597
3 in.	38.674	10.218
3 ½ in.	28.752	7.596
4 in.	22.226	5.872
5 in.	14.061	3.715
6 in.	9.5160	2.514
8 in.	5.4523	1.441
10 in.	3.4507	0.912
12 in.	2.3318	0.616
14 in.	1.9186	0.507
16 in.	1.4483	0.383
18 in.	1.1390	0.301
20 in.	0.9146	0.242
22 in.	0.7506	0.198
24 in.	0.6311	0.167

SCH 40 WROUGHT STEEL PIPE PER ANSI B36.10

PIPE SIZE	K-Factor PULSES/ U.S. GAL	K-Factor PULSES/ LITER
1 ½ in.	140.030	36.996
2 in.	83.240	21.992
2- ½ in.	59.034	15.597
3 in.	38.674	10.218
3 ½ in.	28.752	7.596
4 in.	22.226	5.872
5 in.	14.061	3.715
6 in.	9.5160	2.514
8 in.	5.4523	1.441
10 in.	3.4507	0.912
12 in.	2.3517	0.621
14 in.	1.9556	0.517
16 in.	1.4970	0.396
18 in.	1.1900	0.314
20 in.	0.9577	0.253
24 in.	0.6662	0.176

K-factors are listed in U.S. gallons and in liters. Conversion formulas for other engineering units are listed below.

- **K = 60/A**

The K-factor is the number of pulses generated by the 2540 paddlewheel per unit of liquid in a specific pipe size.

To convert K from:	to:	multiply K by:
U.S. gallons	cubic feet	7.479
U.S. gallons	cubic inches	0.00433
U.S. gallons	cubic meters	263.85
U.S. gallons	pounds of water	0.120
U.S. gallons	acre feet	325853
U.S. gallons	Imperial gallons	1.201

10. Specifications

General Data

Flow velocity range:	0.1 to 6 m/s (0.3 to 20 ft/s)
Linearity:	±1% of full range
Repeatability:	±0.5% of full range
Pipe range:	
• Standard version:	38 to 610 mm (1.5 to 24 in.)
• Hot-Tap version:	38 to 914 mm (1.5 to 36 in.)
Sensor fitting options:	316 SS with 1.5 in. NPT threads, OR 316 SS with ISO 7-R 1½ threads
Cable length:	7.6 m (25 ft.), can splice up to 300 m (1000 ft.)
Cable type:	2-conductor twisted-pair with shield

Electrical Data

Supply voltage:	5 to 24 VDC
Supply current:	1.5 mA max.
Output type:	Open collector, sinking
Output current:	10.0 mA max.

Wetted Materials

Sensor body:	316 stainless steel
Sensor fitting:	316 stainless steel
Sensor fitting O-rings:	Standard FPM, optional EPDM
Rotor:	CB7 Cu-1 alloy 17-4 per AMS5355H
Rotor shaft:	Tungsten carbide (standard) 316 stainless steel (option)
Shaft retainers (2):	316 stainless steel
Rotor bearings (2):	Fluoroloy B®

Quality Standards

- Manufactured under ISO 9001 and ISO 14001
-  China RoHS (Go to www.gfsignet.com for details)

Fluid Conditions

Maximum operating pressure/temperature:

- Sensor with standard FPM sensor fitting O-rings:
17 bar (250 psi) @ 82°C (180°F)
- Sensor with optional EPDM sensor fitting O-rings:
17 bar (250 psi) @ 100°C (212°F)

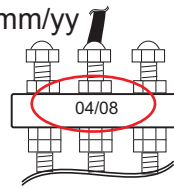
Note: Pressure/temperature specifications refer to sensor performance in water. Certain chemical limitations may apply. Chemical compatibility should be verified.

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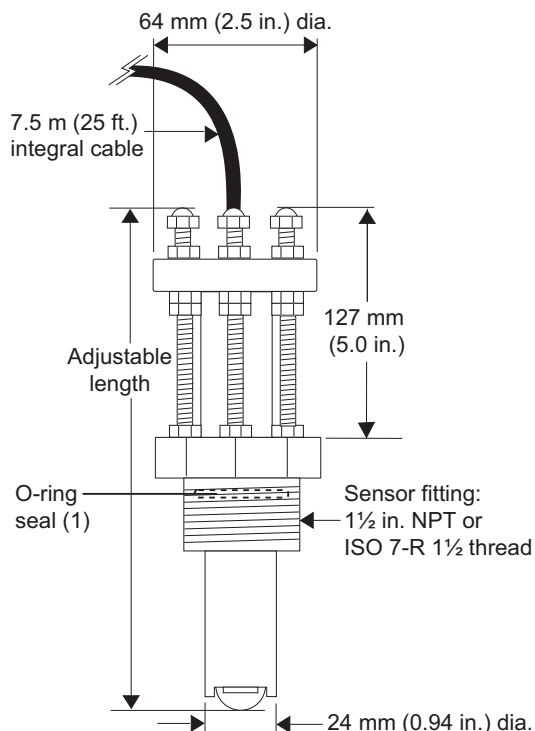
ex. 04/08

04 - month of April

08 - year 2008

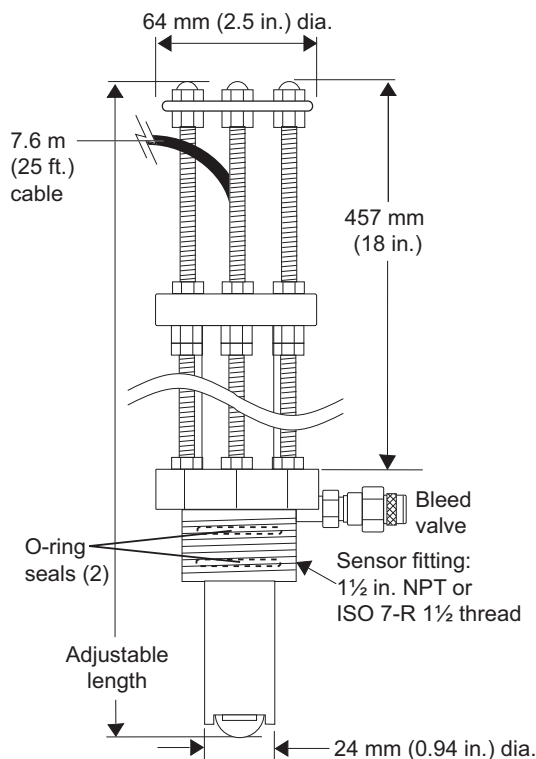


Caution: The 2540 Hot-Tap system's overall specifications and limitations depend on the lowest maximum rating of the components associated with the system. In other words, the Hot-Tap system is only as strong as its weakest link. For example, a ball valve, a component of the system, is rated at a maximum 100 psi @ 175°F, limiting the entire system's maximum pressure/temperature rating to 100 psi @ 175°F. All higher maximum specifications **MUST** yield to the component with the lowest maximum specification.



Standard Sensor Dimensions:



- 2540-1(S) = 1½ in. NPT fitting
- 2540-2(S) = ISO 7-R 1½ fitting



Hot-Tap Sensor Dimensions:

- 2540-3(S) = 1½ in. NPT fitting
- 2540-4(S) = ISO 7-R 1½ fitting

11. Ordering Information

Sensor Part Number				
3-2540	Stainless Steel High Performance flow sensor with removable electronics			
	Mounting option - choose one			
	-1	1½ inch NPT thread		
	-2	1½ inch ISO thread		
	-3	1½ inch NPT thread, hot tap design*		
	-4	1½ inch ISO thread, hot tap design*		
		Rotor Pin Material		
		-	Tungsten Carbide	
		-S	Stainless Steel	
3-2540	-1		Example Part Number	

*Must use 3-1500.663 Hot-Tap installation tool (ordered separately)

Mfr. Part No.	Code	Mfr. Part No.	Code
3-2540-1	198 840 035	3-2540-1S	159 001 501
3-2540-2	198 840 036	3-2540-2S	159 001 502
3-2540-3	198 840 037	3-2540-3S	159 001 503
3-2540-4	198 840 038	3-2540-4S	159 001 504

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
3-1500.663	198 820 008	Hot-Tap Installation Tool
1220-0021	198 801 186	O-ring, FPM
1224-0021	198 820 006	O-ring, EPDM
1228-0021	198 820 007	O-ring, Kalrez®
3-2540.321	159 000 623	Rotor Kit, 2540 Tungsten Carbide Pin
3-2540.322	159 000 864	Rotor kit, Stainless Steel pin
P52504-3	159 000 866	Rotor pin, Tungsten Carbide
P52504-4	159 000 867	Rotor pin, 316 SST
3-2540.520	159 000 648	Bearing, Fluoroloy B®/PTFE
P52527	159 000 481	Retainers, SS (1.4401)
3-2541.260-1	159 000 849	Standard replacement electronics module
3-2541.260-2	159 000 850	Hot-Tap replacement electronics module
5523-0222	159 000 392	Cable, per ft.
P51589	159 000 476	Conduit Adapter Kit
P31934	159 000 466	Conduit Cap



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